WHAT IS CLAIMED IS:

1. A balloon catheter comprising:

a catheter body having a proximal end, a distal end, and a balloon inflation lumen extending to the distal end;

a balloon having a distal end, a proximal end attached to the distal end of the catheter body, and an expandable region between the distal and proximal ends; and

a guidewire tube disposed within the balloon and having a proximal end, a distal end, and a guidewire lumen therebetween, wherein the proximal end of the guidewire tube is spaced distally of the distal end of the catheter body.

2. A balloon catheter as in claim 1, wherein the balloon inflation lumen extends from the distal end to the proximal end of the catheter body.

3. A balloon catheter as in claim 1, wherein the balloon has a distal neck portion, a proximal neck portion, and wherein the expandable region is between said neck portions.

4. A balloon catheter as in claim 3, wherein the proximal neck portion of the balloon is joined over the distal end of the catheter body.

5. A balloon catheter as in claim 3, wherein the proximal neck portion of the balloon is joined under the distal end of the catheter body.

6. A balloon catheter as in claim 3, wherein the proximal neck portion of the balloon is butt joined to the distal end of the catheter.

7. A balloon catheter as in claim 1, wherein the distal end of the guidewire tube extends distally beyond the distal end of the balloon.

8. A balloon catheter as in claim 7, wherein the distal end of the guidewire tube is spaced-distally from the distal end of the expandable region of the balloon by a distance greater than the distance between the proximal end of the guidewire tube and the proximal end of the expandable region of the balloon.

9. A balloon catheter as in any of claims 1-7 or 8, wherein the proximal end of the guidewire tube opens through the expandable region of the balloon.

10. A balloon catheter as in any of claims 1-7 or 8, wherein the proximal end of the guidewire tube opens through the proximal neck portion of the balloon at a location distal of the proximal end of the catheter body.

11. A balloon catheter as in claim 10, wherein the proximal end of the guidewire tube is positioned within the proximal portion of the balloon so that inflation medium from the inflation lumen of the catheter body can pass the guidewire tube and enter the expandable region of the balloon.

12. A balloon catheter as in any of claims 1-7 or 8, wherein no portion of the catheter body overlaps axially with a portion of the guidewire tube.

13. A balloon catheter as in claim 12, wherein the gap between the catheter body and the guidewire tube is at least 1 mm.

14. An improved catheter of the type comprising a catheter body and an interventional or diagnostic element at a distal end of the catheter body, wherein the improvement comprises a guidewire tube passing through the interventional element wherein the guidewire tube has a proximal end which is spaced distally of a distal end of the catheter body, by a distance less than that of a distal end of the guidewire tube from the interventional element..

15. An improved catheter as in claim 12, wherein the interventional or diagnostic element is selected from the group consisting of balloons, mechanically expandable elements, ultrasonic transducers, radiation sources, heating sources, cryogenic sources, drug release mechanisms, atherectomy elements, thermal detectors, and optical coherence tomography (OCT) elements.